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PROJECT
Contemporary
Historical
Examination of
Current
Operations
REPORT

ROLLING THUNDER
JANUARY 1967 - NOVEMBER 1968
1 OCTOBER 1969

HQ PACAF
Directorate, Tactical Evaluation
CHECO Division

Prepared by:
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Project CHECO 7th AF, DOAC

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14. ABSTRACT Project CHECO was established in 1962 to document and analyze air operations in Southeast Asia. Over the years the meaning of the acronym changed several times to reflect the escalation of operations: Current Historical Evaluation of Counterinsurgency Operations, Contemporary Historical Evaluation of Combat Operations and Contemporary Historical Examination of Current Operations. Project CHECO and other U. S. Air Force Historical study programs provided the Air Force with timely and lasting corporate insights into operational, conceptual and doctrinal lessons from the war in SEA.					
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The counterinsurgency and unconventional warfare environment of Southeast Asia has resulted in the employment of USAF airpower to meet a multitude of requirements. The varied applications of airpower have involved the full spectrum of USAF aerospace vehicles, support equipment, and manpower. As a result, there has been an accumulation of operational data and experiences that, as a priority, must be collected, documented, and analyzed as to current and future impact upon USAF policies, concepts, and doctrine.

Fortunately, the value of collecting and documenting our SEA experiences was recognized at an early date. In 1962, Hq USAF directed CINCPACAF to establish an activity that would be primarily responsive to Air Staff requirements and direction, and would provide timely and analytical studies of USAF combat operations in SEA.

Project CHECO, an acronym for Contemporary Historical Examination of Current Operations, was established to meet this Air Staff requirement. Managed by Hq PACAF, with elements at Hq 7AF and 7AF/13AF, Project CHECO provides a scholarly, "on-going" historical examination, documentation, and reporting on USAF policies, concepts, and doctrine in PACOM. This CHECO report is part of the overall documentation and examination which is being accomplished. Along with the other CHECO publications, this is an authentic source for an assessment of the effectiveness of USAF airpower in PACOM.



MILTON B. ADAMS, Major General, USAF
Chief of Staff

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FOREWORD

This third "ROLLING THUNDER" CHECO report about air operations against North Vietnam is concerned primarily with the plans, statistics, and eventual results of the program for the years 1967 and 1968. Although the Air Force role is stressed, vital contributions from other services are recorded to achieve proper balance; basic trends and comparisons are valid.

In January 1967, air operations forced Hanoi to pay heavily for its aggression against the Republic of Vietnam. In addition, airstrikes had generated serious economic upheavals in North Vietnam, and had presented a dramatic picture of U.S. power and determination, culminating in the initiation of negotiations in Paris.

Planning for airstrikes against North Vietnam began in June 1964, when the Joint Chiefs of Staff (JCS) asked CINCPAC to prepare targets in North Vietnam for airstrikes. ROLLING THUNDER (RT) attacks began in March 1965, and are detailed in two earlier CHECO reports.

References made to the ROLLING THUNDER Target List (RTTL) refer to JCS' Designated Targets that required JCS' authorization for a strike. The lists, constantly in a state of change, due to additions and deletions, were numbered: RT 1, 2, 3, etc. The Alpha Targets of the RTTL were those considered the most critical in Route Packages V and VIA (ROLLING THUNDER Handbook, July 1968). A more detailed explanation of the ROLLING THUNDER Target List is presented in Section II of this handbook.

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COMMAND OF ROLLING THUNDER

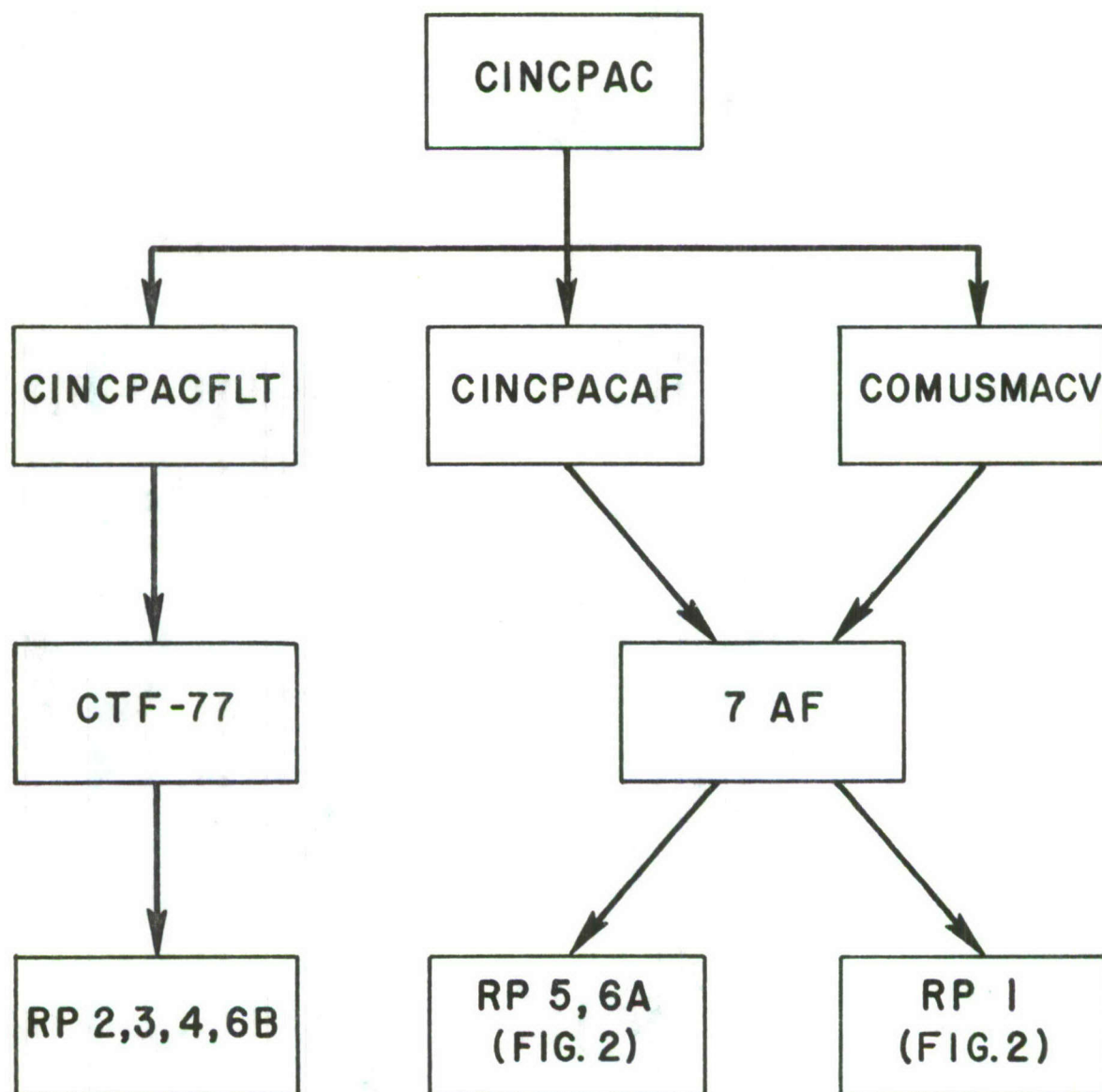


FIGURE 1

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INTRODUCTION

After assessing the operations of 1966, the Commander-in-Chief, Pacific Command (CINCPAC) reviewed the U.S. objectives in Vietnam and projected the military strategy to pursue those aims in 1967. The conduct of the war in Vietnam embraced three interdependent undertakings which together constituted an integrated concept. These undertakings were: ^{1/}

- . Take the war to the enemy in the north by unremitting but selective application of U.S. air and naval power.
- . Seek and destroy Communist forces and infrastructure in South Vietnam by offensive military operations.
- . Extend the secure areas of South Vietnam by coordinated civil-military operations and assist the government of South Vietnam in building an independent, viable, non-communist society.

The bombing of North Vietnam, with the nickname "ROLLING THUNDER, had a twofold objective: ^{2/}

- . To apply steadily increasing pressure against North Vietnam to cause Hanoi to cease its aggression in South Vietnam.
- . Make continued support of the Viet Cong insurgency as difficult and costly as possible.

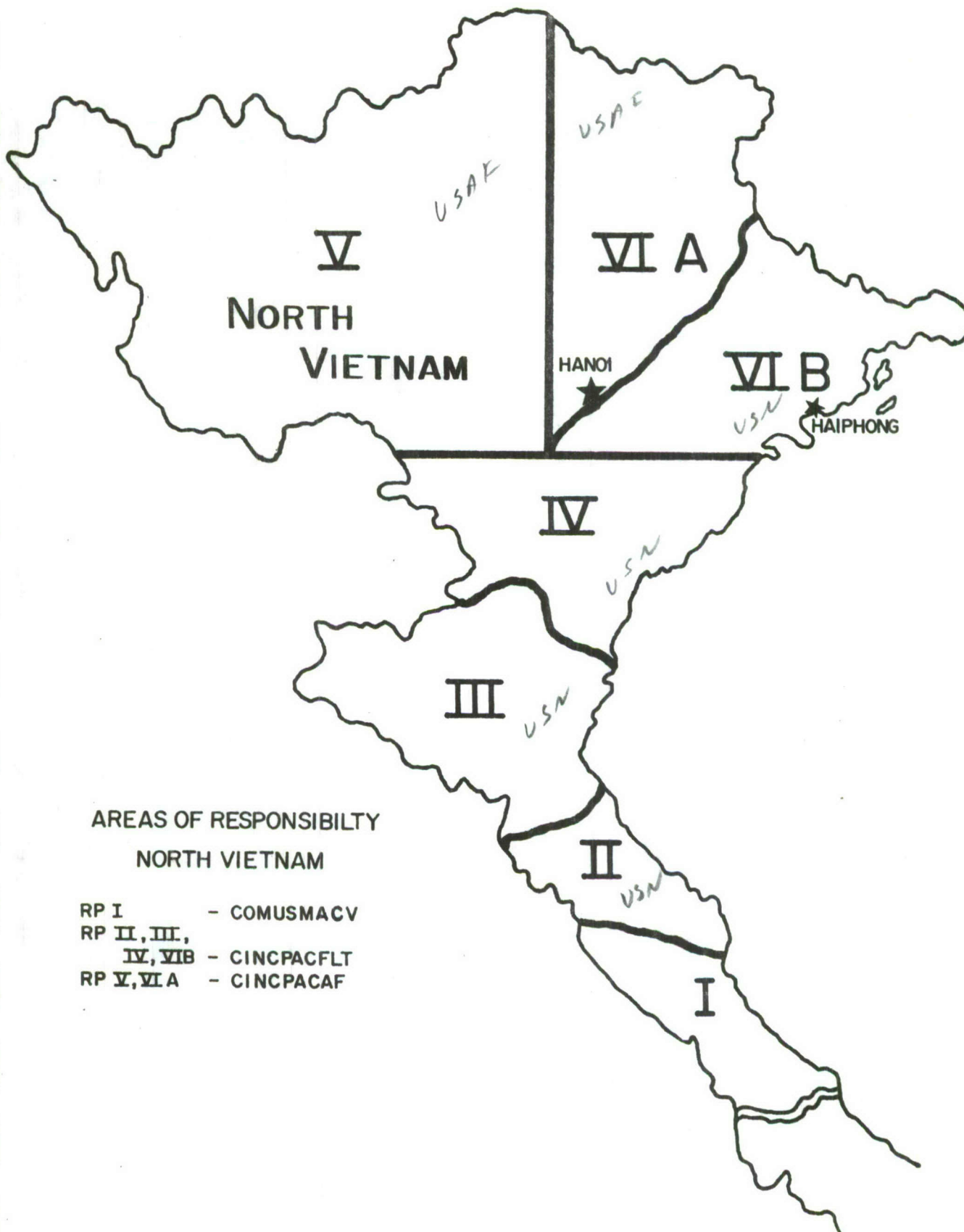
The tasks to accomplish this objective were as follows: ^{3/}

- . Reduce or deny external assistance to North Vietnam.
- . Disrupt and destroy in depth those resources that contribute most to the support of aggression.
- . Harass, disrupt, and impede movement of men and materials to Laos and South Vietnam.

[REDACTED]

The ROLLING THUNDER campaign was conducted under the overall direction of the Commander-in-Chief, Pacific Command but the responsibility for operations within various geographical areas was delegated to three separate Commands (Fig. 1).^{4/} The Commander-in-Chief, Pacific Fleet (CINCPACFLT) was responsible for Route Packages (RPs) II, III, IV, and VIB, and operations in these Route Packages were conducted by the U.S. Naval Commander, Task Force (CTF-77), operating in the Gulf of Tonkin. The Commander-in-Chief, Pacific Air Forces (CINCPACAF) was responsible for Route Packages V and VIA; operations there were conducted by forces under the operational control of Seventh Air Force (7AF). The Commander, Military Assistance Command, Vietnam (COMUSMACV) was responsible for Route Package I, and 7AF, the MACV Air Component Command, conducted RP I operations. (Fig. 2 depicts Command Responsibility by Route Packages.)^{5/}

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AREAS OF RESPONSIBILITY
NORTH VIETNAM

- RP I - COMUSMACV
- RP II, III, IV, VI B - CINCPACFLT
- RP V, VI A - CINCPACAF

FIGURE 2

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CHAPTER I

ROLLING THUNDER 1967

The ROLLING THUNDER campaign was a gradually increasing effort against North Vietnam (NVN). Initially, the air war over NVN had been greatly restricted by political constraints on the targets that were cleared for strikes, and U.S. airpower had been employed against a small sector in the southern area of NVN. As it became apparent that more pressure would be required to bend the enemy's will, the operating area was slowly expanded and the level of effort was gradually increased, but still many targets were held under the strict control of the highest national authorities. During 1966, the bulk of the targets hit had been in the southern panhandle. Up to 1967, the air war had been mainly an effort to interdict or slow down the flow of men and materiel from NVN to RVN.^{1/}

In the 1966 End of Year Report, CINCPACAF reviewed the 1966 ROLLING THUNDER operations and made targeting recommendations to CINCPAC. CINCPACAF's assessment of 1966 operations revealed that destruction of thousands of vehicles, hundreds of rail and highway bridges, and thousands of tons of POL had indeed impeded the movement of war materials. This disruptive effect of airpower had been a prime factor in the inability of the Communist forces to mount or sustain an all-out offensive in RVN. However, enemy reactions to the interdiction campaign had been prompt and resourceful. Pack animals and human portage had been used as alternate means to transport war materials. Watercraft had been increasingly used to offset loss of trucks, railroad rolling stock, and interdicted road and rail lines of communications (LOCs). One of the lessons

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learned during 1966 was that a gradual, drawn-out, and cautiously constrained air campaign created very little psychological impact on the NVN leaders and populace. However, destruction by airpower of even a few targets in the vicinity of Hanoi and Haiphong was believed to have had a considerable impact--physical as well as psychological. According to CINCPACAF, 1967 should see the war brought to the heartland of NVN, with increased violence and precision. All significant military targets should be attacked while continuing to avoid civilian populated areas. No sanctuaries should remain around Hanoi, Haiphong, and the ChiCom Border area. CINCPACAF believed that the enemy's will and his resources of men and materiel could be exhausted by pressure on Hanoi, attrition of war materiel, and aggressive search and destroy operations within RVN.^{2/}

CINCPACAF's recommendations for 1967 were partially approved, and the force of ROLLING THUNDER was significantly amplified in three ways: more targets were authorized for strike; many of the newly approved targets lay farther north, nearer the source of the enemy's strength; and finally, the fleet of strike aircraft had become more effective through increased numbers, modernization, new munitions, and improved tactics. Thus, it became possible to strike harder at the enemy's war-making ability in the Red River Delta and to harass his northern LOCs while continuing the interdiction efforts in the Southern panhandle.^{3/}

The character of the in-country war was to be changed in a similar fashion. In January 1967, COMUSMACV said:^{4/}

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"While 1966 was a year basically characterized by holding actions and spoiling attacks, 1967 must be a year of general offensives by which we increase the momentum of our success."

Operations

During the first three months of 1967, the monsoon shrouded much of North Vietnam in low-hanging clouds, and strikes against ground targets could not be launched in volume until mid-April. But the USAF was far from idle, while waiting for the weather to break. The time was ripe for a large-scale counter-air mission called Operation BOLO.^{5/}

This mission was intricately planned to achieve deception. A force of fighters would enter North Vietnam along a route and at altitudes usually used by strike aircraft which were carrying heavy bomb loads. The enemy MIGs had frequently risen to harass strike aircraft with the aim of forcing them to jettison bombs well short of their targets in order to defend themselves against the more maneuverable MIGs. It was hoped the MIGs would repeat their customary tactics, as this time they would meet F-4 Phantoms, stripped for fighting and armed to kill MIGs. Operation BOLO was mounted on 2 January 1967, and the MIGs swallowed the bait--seven MIGs were shot down without a single USAF loss.^{6/}

In late January and February 1967, a number of key targets in the north were authorized for strike; the newly approved targets included electric power systems, the steel industry, three major airfields, and a number of lucrative supply dumps. The North Vietnamese rail system was to be the focal point of USAF efforts in RP V and RP VIA, but other important targets

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were not to be ignored. The USAF would strike heavily at war-supporting industries, jet-capable airfields, POL dumps, roads, and bridges. In addition, the Sea Dragon strikes against waterborne logistics craft (WBLCs) were extended as far north as the 20th parallel.

Despite unfavorable weather conditions, 12 of the 16 newly authorized targets had been struck by the end of March 1967. The most significant strikes were against thermal power plants; the Viet Tri and Thai Nguyen Thermal Power Plants were each struck twice in mid-March and rendered inoperative for an estimated twelve-to-eighteen months (Fig. 3). Still, the weather forced the bulk of the bombing south of the more tempting targets. In February and March, the LOCs of RP I received more than 60 percent of the attack sorties allotted to ROLLING THUNDER.^{7/}

On 17 April, the weather conditions improved and the air activity was thrust farther north with heavier blows against strategic targets. By 23 April 1967, the Thai Nguyen Iron and Steel Works had been attacked 11 times and knocked out of operation (Fig. 4).^{8/}

During late April and May, still more important targets were approved for attack, and the tempo of the bombing continued to quicken. In June, the main effort was focused along the rail lines leading south from China; air struck at rail yards, bridges, and repair facilities. Exploiting the favorable weather conditions, the rail system was battered repeatedly. The rail system north and east of Hanoi received the heaviest blows: during June, the line running northeast from Hanoi to China was closed for 25 days; the line running north from Hanoi to Thai Nguyen was severed for 20 days; and the line connecting

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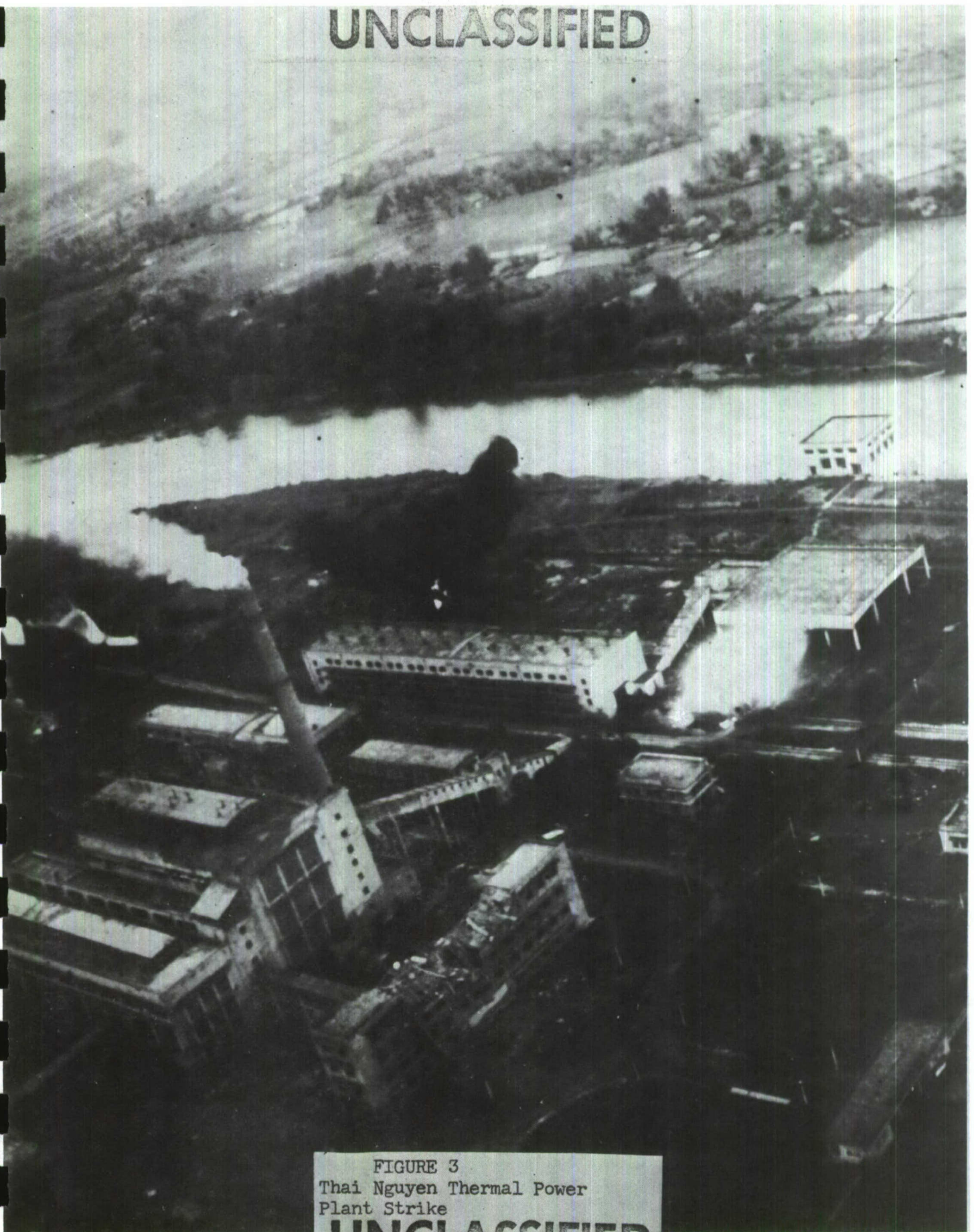


FIGURE 3
Thai Nguyen Thermal Power
Plant Strike

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FIGURE 4
Strike Against Thai Nguyen
Iron and Steel Works

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Thai Nguyen with Kep Airfield was cut for 17 days. Additional attacks pounded at the electrical power system; by mid-June electrical power capacity had been reduced by an estimated 85 percent.^{9/}

In July 1967, the air effort continued at a dynamic pace with emphasis remaining centered on all forms of transportation as well as supply and storage areas. Although there was a slight decline in attacks on the rail system, there were indications that the campaign was having its effect. Apparently the enemy's manpower resources were being heavily taxed; some destroyed targets showed no signs of repair for weeks.^{10/}

In August 1967, the weather again restricted operations in the northern route packages, but the sorties that could be flown were aimed at severing the communications between Hanoi and Haiphong, and also isolating those two key cities from the rest of the country. A total of 46 critical targets had now been authorized for strikes and 26 of these were attacked with more than 600 attack sorties.^{11/}

Two factors combined to reduce the weight of September's attacks against the Alpha targets: weather continued to become worse, and a number of sorties were directed to the south. The enemy bombardment of Con Thien, a friendly fire support base just below the DMZ, brought about Operation NEUTRALIZE--an effort to silence the enemy guns by a massive campaign of airstrikes. Thus, September saw only 351 sorties flown against Alpha targets, and the bulk of this effort again fell on the enemy's rail system. The rail interdiction campaign had imposed the necessity for the enemy to offload freight for transshipment around rail cuts. In May, 152,000 short tons required transshipment;

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by August 1967, this figure had risen to 259,000 short tons, and this latter monthly rate was maintained during September, despite the lower level of activity.^{12/}

October 1967 brought a brief improvement in weather conditions and a lifting of the restriction on targets within 10 miles of Hanoi. As a result, the percentage of airstrikes allocated to RP VI was twice that of September's share and 970 sorties struck at Alpha targets.^{13/}

Adverse weather limited activity during both November and December 1967--especially in the northern route packages. Attack sorties against Alpha targets fell to about 300 in November and a low of 164 in December. Strikes in December were sufficient only to offset the enemy's repair efforts--the damage level to the main target systems remained relatively unchanged during the month.^{14/}

Although the main effort in 1967 was against the northern rail network, a particularly significant and instructive campaign was mounted around the Port of Haiphong. The following discussion of this campaign is presented to illustrate some of the detailed planning that was required and a number of the operational difficulties that were encountered during the campaign to isolate Haiphong.^{15/}

Isolation of Haiphong

The Port of Haiphong, with an estimated capacity of 3,800 short tons per day, had historically been the primary entry point for seaborne supplies coming into NVN from Communist and Free World nations. Therefore, it was a prime

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target for air attacks.^{16/}

The fear of USSR/ChiCom reaction had precluded a direct attack on the port. Thus, it became necessary to devise peripheral interdiction methods to deny the enemy the full benefits of the port.^{17/}

The enemy moved record tonnages through the port complex in 1967. He had exceeded the normal capacity of the port for as many as five consecutive months. He used alternate offloading means to bypass the limited dock facilities, and he supplemented the available warehousing by storing large amounts of materiel within the city of Haiphong.

Given these expedients, it became apparent that the primary factor limiting port through-put was the system for moving supplies out of the port area toward their destinations.

Much of the imported seaborne tonnage was initially stored in open areas within the Haiphong three-mile, restricted area. Although there were limitations on the distribution system, various means of logistic movement existed. All goods to be moved to the south by rail were sent from Haiphong to Hanoi, then south to Thanh Hoa, Vinh, and then through Dong Hoi to the DMZ. Two minor highways emanated from Haiphong: Highway 5 to Hanoi and Highway 10, south to Thai-Binh. From Thai-Binh, the primary southward movement followed Highway 10 to the intersection of 1A, the major north/south highway between Hanoi and the DMZ. Logistic movement from Haiphong was also accomplished by Waterborne Logistic Craft using the many inland waterways and the coastal waters.^{18/}

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The Air Staff developed a concept for isolation of the port of Haiphong which called for a concentrated interdiction "ring" around Haiphong to deny the enemy use of his lines of communications from the port to the interior. The plan was presented to CINCPAC on 24 July. The concept visualized 1,184 initial bombing sorties, and 1,200 support sorties to neutralize or destroy 58 targets. It was also estimated that 60 restrikes per day would be necessary to assure continuous interdiction. With both AF and USN participation, the initial strike phase could have been completed in five days. A 50 to 70 ^{19/} percent reduction was predicted in the flow of materiel from the port.

CINCPAC modified the original plan and assigned responsibility for its implementation to PACFLT. The isolation was to be accomplished more gradually than the Air Staff had recommended. The actual air effort in the Haiphong area began on 8 August 1967, and averaged only 18 attack sorties per day instead of the originally planned 120 sorties per day. Only 10 percent of the ROLLING THUNDER attack sorties flown by the Navy were for the purpose of isolating Haiphong. Beginning in late September, there was a significant increase in the weight of effort. ^{20/} By 26 October 1967, 890 strike sorties had been flown against the four primary interdiction points: Kien An Highway Bridge, Haiphong Highway Bridge, Haiphong Railroad/Highway Bridge and Haiphong Highway Bridge SSE. Armed reconnaissance accounted for an additional 485 sorties. ^{21/}

The interdiction campaign interrupted movement significantly on 18 September, when three of the four bridges were rendered unusable. The capacity for distributing supplies by land was further reduced to 1,900 short tons per day (STPD) with the destruction of the Kien An Highway Bridge on 26 September. The

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bridge on Route 5 to the NW was made serviceable for four days in October, and the total distribution capacity went up to 7,650 STPD, well above the daily average of shipments into Haiphong. Thus, if either of the two bridges connecting Haiphong with Route 5 were allowed to remain serviceable, the entire capacity of the port could be distributed.^{22/}

Since backlogs in the port area did not increase after 26 September, it appeared the enemy was transporting large quantities of materiel via his waterway systems. Part of the unloading operations in the harbor was conducted by lighters (large barges). After offloading, the barges were concealed at night under the trees along the banks of the Cua Cam River.^{23/}

While the campaign did disrupt the normal flow of materiel from the Port of Haiphong, the enemy compensated for this to a degree by shifting a portion of his movements to water transportation. Further, it appeared the logistic capacities available in the Haiphong area had not been fully utilized to clear cargoes from the port area prior to the interdiction effort. Possible reasons could have been labor and carrier shortages, management and distribution difficulties, and the probable use of Haiphong as a relatively safe storage area for goods not urgently needed inland.^{24/}

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CHAPTER II

SUMMARY OF 1967

One great liability from the outset of the war had been that NVN had few, if any, munitions industries and the enemy's war materiel had to be imported from other countries. Ports were adequate to import large tonnages relatively near the battle area. Haiphong was the most important deep water harbor in NVN. Before the bombing, NVN had a very efficient rail net that connected Vinh with the China Border through the hubs of Hanoi and Haiphong. The road net prior to the bombing was one of the best in Southeast Asia. Yet, rapid and significant deterioration of the logistic system occurred early in the bombing campaign. The North Vietnamese were limited to the use of the northern seaports--Haiphong, Cam Pha, and Hon Gia. The rail lines were severely mauled south of Haiphong, and north of Hanoi; service was significantly reduced. The road net also was heavily attacked and service again was reduced far below prewar levels. Bridges were the primary targets on both rail and road nets. The maximum results were achieved during late 1967; the effectiveness of interdiction peaked at the close of the year. The enemy was limited to shuttle traffic on all lines heading into Hanoi. Both of the major rail/highway bridges in Hanoi were unserviceable as were the key bridges around Haiphong. South of Thanh Hoa to Vinh, the rail lines were severely damaged. Entire segments from Vinh south had been destroyed, with tracks missing, roadbeds demolished, and every major bridge destroyed.^{1/}

COMUSMACV reported that more than 30 percent of the NVN railroad system had been destroyed, along with one-half of the enemy's storage facilities. The

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North Vietnamese made a rigorous attempt to shift to maritime transportation and Haiphong continued to be increasingly more active. The overall effect of the Allied effort to reduce external assistance resulted not only in destruction and damage to the transportation system and the goods being transported, but caused severe problems in management, distribution, and manpower. The attacks caused a bottleneck at Haiphong, where an inability to rapidly move goods inland from the port had resulted in congestion on the docks and slow-down in the offloading of ships as they arrived. By October, the transportation clearance capacity of Haiphong was reduced from 4,400 short tons per day to 2,700. Approximately 30 percent of the imported supplies was being destroyed while in transit.

Although supplies and reinforcements continued to flow despite U.S. attacks on LOCs, the Allies had made it very costly to the enemy in terms of materiel and manpower.^{2/}

Through external assistance, the enemy had been able to replace or repair many of the items damaged or destroyed, and transport inventories were roughly at the same level that had existed at the beginning of the year. Nevertheless, the attacks caused interruptions in the flow of men and supplies, caused a great expenditure of work hours, and restricted movement, particularly during daylight hours. A primary effect of air efforts to impede movement of the enemy had been to force Hanoi to engage from 500,000 to 600,000 civilians in full-time and part-time war-related activities, in particular, for air defense and repair of the LOCs. This diversion of manpower from other pursuits, particularly from the agricultural sector, caused an increase of agricultural imports by a

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factor of six over those of 1966.^{3/}

Strikes over NVN, particularly in the vital Northeast sector, had encountered increased opposition. The results for the year had been a reduction in NVN's fighter aircraft capability and frequent disruption of operational airfields. At the beginning of the year, NVN had about 72 fighter aircraft on its airfields. By the end of October, all but one airfield had been struck and approximately 20 fighter aircraft were operating from airfields within NVN. Probably the most notable reaction to the U.S. bombing had been the enemy build-up of his air defense systems. The number of SAM sites had increased to 270 (30-35 of which were occupied), an increase of 119 sites over 1966. Although about 3,495 SAM firings were noted in 1967 as compared with 990 firings in 1966, SAM kill-ratios actually declined. The total AAA weapons increased from approximately 830 guns to a high of 7,959 for 1967.^{4/}

The campaign against the electrical power system resulted in the reduction of power generating capability to approximately 15 percent of the country's original capacity. The power reduction produced a considerable economic loss. Successful strikes against the Thai Nguyen Iron and Steel Plant and the Haiphong Cement Plant resulted in practically total destruction of those two installations. In addition, total industrial production was estimated to have been reduced by as much as 50 percent. Although the reduced industrial production caused some immediate adverse effects on the NVN economy, the longer term cumulative effects were considered to be of greater significance.^{5/}

In an overall assessment for Ambassador Ellsworth Bunker, COMUSMACV took an optimistic position in contrasting the situation in the two Vietnams:^{6/}

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"In appraising the current situation, it is helpful to consider developments from the viewpoint of the North Vietnamese authorities in Hanoi. The war has forced NVN toward national mobilization, perhaps total mobilization. As a consequence, little, if anything, is being accomplished except support of the war. On the other hand, the economy, industrial base, and infrastructure of NVN are progressively deteriorating or being destroyed by our air and naval campaigns. At the same time, the cream of their youth and the best of their military leadership are being sent to the South, many of them never to return. Specifically: 85 percent of their power generating resources have been destroyed; 30 percent of their railroad system has been destroyed; 50 percent of their railroad repair capabilities have been destroyed. Their steel and cement plants have been rendered incapable of production; 3,500 trucks and 4,000 watercraft have been destroyed in the last ten months; their MIG aircraft have been reduced by 50 percent. They have been forced to divert an estimated 500,000 people to maintain and repair roads, railroads, and vital facilities. Food shortages have developed requiring that flour be used to replace rice in some areas. There is little or no fresh meat available in the cities. In summary, the country is undergoing severe deterioration.

"What have the North Vietnamese authorities got to show for this expenditure of effort and cost? Little, if anything. The North Vietnamese Army has not won a single major victory in the south, despite the fact that they have suffered tremendous losses on the battlefield. Their plans have failed to achieve their objectives."

This evaluation of ROLLING THUNDER 1967, based only against these stated objectives: "To apply steadily increasing pressure against NVN in order to cause Hanoi to cease its aggression in SVN and to make continued support of the Viet Cong insurgency as difficult and costly as possible," was generally accurate. The ROLLING THUNDER operation did increase the pressure against NVN within the confines of the operational limitation required by higher

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authority, and made further support of the Viet Cong insurgency difficult and costly.

Figure 5 depicts the number of ROLLING THUNDER targets damaged or destroyed in 1967 by month and category. Figure 6 is a summary chart of air defense activity by NVN; it includes U.S. aircraft losses due to SAMs, MIGs, AAA/AW, and unknown causes. Figure 7 details the distribution of attack sorties by percent of the total effort for 1967.^{7/}

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ROLLING THUNDER TARGETS D/D, 1967
(Monthly, by Category)

TARGET	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL D/D
AA/AAA Sites	74	40	28	95	283	252	283	305	164	184	137	78	1,923
SAM Sites	4	9	3	7	50	31	32	42	13	15	19	11	227
Communication Sites	7	4	10	8	11	16	20	14	9	12	17	12	140
Military Areas	31	11	95	26	113	61	70	75	100	139	58	28	807
POL Areas	2	0	4	10	23	29	37	17	6	7	4	1	130
Staging/Supply Areas	20	31	61	69	159	200	168	376	180	107	130	77	1,568
Buildings	92	77	151	214	295	202	204	407	214	573	809	277	3,516
LOCs	372	226	472	728	904	869	734	857	431	322	344	226	6,485
Ports	6	3	4	14	5	3	6	19	1	11	8	4	84
Power Plants	9	2	4	5	2	9	1	1	0	5	0	1	30
Railroad Yards	11	2	2	5	26	53	35	10	10	7	5	3	179
Motor Vehicles	60	122	217	263	597	689	858	1,396	498	308	210	358	5,576
Railroad Vehicles	121	98	56	124	132	604	411	325	99	214	199	124	2,507
Water Vehicles	616	493	671	1,154	1,725	1,226	671	1,675	904	1,042	1,061	460	11,698
TOTAL	1,425	1,118	1,778	2,722	4,325	4,244	3,530	5,519	2,629	2,946	3,001	1,660	34,870

FIGURE 5

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SUMMARY OF AIR DEFENSE ACTIVITY - NVN

1967

Month	SAM		MIG			AAW/AW		U.S. Loss
	No. of Firings	U.S. Losses	Engage-ments	Losses NVN	U.S.	Total Posi-tions	Total Occ Posi-tions	
January	271	3	16	9	0	28826	7126	17
February	132	2	2	0	0	29507	7037	5
March	158	3	6	2	0	31479	7094	21
April	246	5	50	29	7	32479	7179	17
May	431	9	72	26	2	32695	7227	29
June	205	2	25	5	1	33899	8335	24
July	298	6	12	3	0	34632	8511	31
August	441	8	16	4	2	34964	8796	29
September	169	2	16	0	1	35140	8964	13
October	582	8	29	8	3	34572	8479	28
November	349	11	27	3	6	35708	7966	18
December	<u>246</u>	<u>2</u>	<u>34</u>	<u>4</u>	<u>3</u>	<u>36266</u>	<u>7930</u>	<u>11</u>
TOTALS	3528	61	305	93	25	N/A	N/A	243

FIGURE 6

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DISTRIBUTION OF ATTACK SORTIES
BY
PERCENT OF TOTAL EFFORT
1967

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>VI A</u>	<u>VI B</u>
January	43	6	16	22	4	7	2
February	64	6	10	12	2	3	3
March	60	9	11	8	4	3	5
April	49	11	13	6	5	7	8
May	39	13	19	11	3	10	6
June	36	13	17	11	4	14	5
July	38	8	7	10	4	14	19
August	48	8	10	7	2	12	13
September	56	8	7	8	3	9	9
October	41	3	6	11	3	16	20
November	52	5	7	10	4	7	7
December	57	8	7	10	4	7	7

FIGURE 7

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CHAPTER III

TARGET LIST AND AIR DEFENSE

In 1968, the mission of ROLLING THUNDER remained "to conduct an unremitting but selective airpower campaign against NVN." Specifically, the tasks were as follows:^{1/}

- . Reduce or deny economic, material, and war supporting assistance to NVN from external sources.
- . Disrupt and destroy in depth those resources that contribute to the support of the NVN effort.
- . Harass, disrupt, and impede movement of men and materials to Laos and SVN.

The NVN armed reconnaissance Route Package (RP) areas were designed to establish responsibility for target development and analysis and the collection of intelligence data. COMUSMACV was assigned responsibility for Route Package I; Pacific Fleet (PACFLT) for Route Packages II, III, IV, and VIB; and PACAF for Route Packages V and VIA. Any service could operate in any of the areas, however, all aircraft had to observe the operational procedures developed for each RP by the responsible agency.^{2/}

From 1 January through 31 March 1968 was probably the most frustrating of all ROLLING THUNDER periods. With only four days of good weather, it was necessary for nearly all missions to be conducted using radar bombing techniques, and results could not be observed through the undercast. During this three-month period, the effort against NVN was down to 14,678 attack sorties from the 21,983 attack sorties of the preceding quarter--a drop of 7,296.^{3/}

Although weather was the dominant factor in reducing the weight of

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ROLLING THUNDER, the New Year and Tet standdowns also contributed to the low level of air effort during the quarter. The New Year standdown, lasting 36 hours, permitted the enemy to move 1,795 trucks through RPs I, II, III, and IV--most of them heading south. The significance of this large movement becomes apparent when contrasted to the total of only 513 trucks noted in these same areas during the 96-hour period just prior to the truce. The Tet standdown consisted of a 48-hour cease-fire followed by another 36-hour cease-fire. Of course, the VC/NVA forces used this period to move their forces into advantageous positions.^{4/}

In the northern Route Packages, approximately six days of operational weather had been forecast, but only four days were clear enough for visual strikes. February brought the poorest flying conditions in three years, and March was little better with the Northeast Monsoon prevailing nearly the entire month.^{5/}

The unpredicted bad weather conditions in the northern RPs forced a very high percentage of attack sorties into the southern RPs. Percentages of the total sorties flown in the various Route Packages during the last quarter of 1967 are compared with the first quarter of 1968 as follows:^{6/}

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DISTRIBUTION OF ATTACK SORTIES

BY

ROUTE PACKAGE

ROUTE PACKAGE PERCENTAGES							
MONTH	I	II	III	IV	V	VIA	VIB
October	41	3	6	11	3	16	20
November	52	5	7	11	5	7	13
December	57	8	7	10	4	7	7
January	47	8	11	12	6	8	8
February	72	3	8	2	5	8	2
March	68	8	5	6	2	5	6

Despite the generally poor weather conditions in January, the Air Force and Navy increased the number of sorties flown in NVN with heavy emphasis on RP I targets. In addition to the New Year and Tet standdowns and the bad weather, further political restrictions were imposed on RT 57 which curtailed attacks on nine of the active RTTL targets assigned to the USAF and six targets assigned to the Navy.^{7/}

In February, the weather conditions caused attack sorties to drop to a low of 3,349. As bad as it was, the USAF attacked targets in each of the RPs as follows:

Route Package	I	II	III	IV	V	VIA	VIB
Number of Days	29	1	13	3	22	19	5

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The majority of the sorties in RPs V and VIA used COMMANDO NAIL (aircraft integral radar bombing system), and the COMMANDO CLUB (ground controlled radar bombing system) techniques.^{8/}

Attack sorties increased in March to a total of 5,037, with RP I again receiving the major percentage of the total effort. Radar bombing was again the primary means of attacking targets since the weather remained extremely poor throughout the month. Bomb damage assessment (BDA) was, of course, negligible, thus grossly reducing the ability to assess the effectiveness of the strikes.^{9/}

ROLLING THUNDER Target List - 1st Quarter 1968

The ROLLING THUNDER Target List was the basis for all strikes in North Vietnam. This listing of the most significant targets included those designated by JCS and served as the priority strike list for all PACOM units. Targets were added, deleted, or moved to appropriate appendixes when necessary. Changes were based on new intelligence and developing operational considerations. The list was established as Annex A to the ROLLING THUNDER basic Operations Order and was subdivided into five appendixes. The following is a brief description of each appendix:^{10/}

APPENDIX 1, Authorized Priority Targets. A list of validated targets that could be struck without additional approval from the JCS and CINCPAC. These targets were accorded special strike emphasis.

APPENDIX 2, Unauthorized Priority Targets. A list of validated targets which required strike approval from higher authority. CINCPAC was

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required to seek approval for selected targets on this list.

APPENDIX 3, Targets Under Consideration. A list of other significant targets which were being reviewed for appropriate action.

APPENDIX 4, Unserviceable. A list of targets which were previously listed in Appendixes 1, 2 or 3 and had been rendered unserviceable, or against which strike/restrike was no longer required.

APPENDIX 5, Neutralized or Abandoned. A list of inactive targets previously listed primarily in APPENDIX 4 that had been neutralized or abandoned and which showed no evidence of regeneration or activation.

Airstrikes in support of ROLLING THUNDER objectives were limited by poor operational flying weather and restricted areas around the cities of Hanoi and Haiphong during the first quarter of 1968. Sixty targets were initially struck or restruck during this period, which increased the number of RTTL targets attacked to 331. As of 31 March, 245 of the 456 RTTL targets were unserviceable, inactive, or not worthy of strikes.

During this quarter, authority was granted to add nine targets to the RT 57 Alpha list. Alpha lists consisted of targets which had been approved for planning purposes, but could not be attacked until specific approval was granted at the highest level and execution orders were received. Seven of these targets were attacked; marginal weather, however, precluded striking the remaining two. By the end of the quarter, a total of 85 of the 94 RT 57 Alpha targets had been attacked. ^{11/}

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There was continuing evidence of NVN's ability to compensate for the bombings of key lines of communications (LOCs) by using adjacent bypasses. A graphic example was the bypassing of the Doumer Bridge--even though the bridge was down, the NVN continued to move supplies via ferries and pontoon bridges in the immediate area. Photo reconnaissance on 17 March confirmed the presence of a fixed railroad bypass bridge near Hanoi, substantiating an earlier report that damage to the Doumer Bridge was so extensive the NVN probably would not rebuild it for some time. Regeneration efforts had been extensive. Six previously unserviceable damaged APPENDIX IV targets were repaired and returned to operational status in APPENDIX I.^{12/}

As shown here, the RTTL was composed of six basic systems. Results of airstrikes against these systems prior to and during the first quarter of 1968 were as follows:^{13/}

- . POWER. North Vietnam's electrical power capacity had been disrupted extensively. Fourteen of the 24 electrical power targets had been struck and 6 of those struck were inoperative.
- . INDUSTRY. Twenty-two percent of the targeted NVN industries had been rendered inoperative. Thai Nguyen Iron and Steel Combine remained inoperative; the only other industrial target struck was Van Dien Battery Plant for which no BDA was available.
- . TRANSPORTATION. A major interdiction effort continued against the key lines of communications serving Hanoi and Haiphong. Forty-seven percent of the targeted transportation targets had previously been made unserviceable or abandoned. Despite this, nearly every major LOC in NVN was open to through traffic because of continued reconstruction efforts by the enemy and the construction of multiple bypass bridges and ferries at key river crossings.
- . MILITARY. A total of 117 of the 144 targeted military facilities had been attacked and 73 percent or 106 were unserviceable or

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inactive.

- . POL. One POL target was attacked during this period. It was estimated that 65 percent of the NVN POL storage capacity had been destroyed and approximately 72,000 metric tons of storage capacity remained at numerous widely dispersed locations.
- . AIR DEFENSE. The jet-capable airfields at Kep, Kien An, Hoa Lac, Cat Bi and Phuc Yen were attacked several times and some damage had been inflicted to aircraft and support facilities which had temporarily disrupted NVN air defense operations. Gia Lam remained the only jet-capable airfield that was unauthorized for attack and had not been struck. Strikes were conducted in the lower route packages to counter reconstruction efforts at Dong Hoi, Vinh, and Bai Thung Airfields.

It was difficult to prove the amount of damage that may have been done to the basic target systems of the RTTL during the first quarter of 1968; bad weather had precluded BDA in most instances. A tabular display of the target systems of the RTTL is presented in Figure 8. It shows the number of targets in each of the RTTL Appendixes for each target system, the number of targets struck during the quarter, and the cumulative totals.

Air Defense Activities

Enemy air activity was curtailed to a significant degree during the quarter--the enemy had to contend with the same weather. In January, MIG-21 pilots adhered to their customary tactics of hit-and-run missile attacks against strike aircraft ingressing from Laos. The MIG-17s continued to engage in brief dog fights with stragglers. On several occasions during February, MIG-21s employed a variety of attack patterns against U.S. aircraft; operating singly, the MIG-21s attempted attacks from astern, frontal approaches, and attacks from high altitudes. Dual multiple attacks also were noted in February, whereas in earlier months single aircraft would quickly withdraw

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after the initial surprise attack. A summary of Air Defense is presented here: ^{14/}

MONTH	SAM		ENGAGE- MENTS	MIG		TOTAL POSITIONS	AAA/AW	U.S. LOSS	UNK U.S. LOSS
	NR. OF FIRINGS	U.S. LOSSES		LOSSES NVN U.S.	TOTAL OCC. POSITIONS				
January	140	4	29	4	6	36303	7830	8	6
February	170	3	18	5	4	37242	7641	2	3
March	216	0	5	0	0	37630	7443	6	3

Port and Harbor Activities

A total of 118 foreign ship arrivals were observed during the quarter. They included 54 Soviet, 26 Chinese, 30 from Free World countries, and 8 from other Communist countries. These imports totaled approximately 456,000 metric tons to include about 101,000 tons of POL products and about 137,500 tons of bulk food products. In Haiphong, the traffic was so heavy that many ships were delayed for long periods of time. The congestion was also increased because of frequent air alerts. One Polish seaman was quoted as saying that during an air alert, Haiphong was inundated with shrapnel and shells and that no place was safe without hard overhead cover.

Destructor MK-36

Evidence continued to indicate that MK-36 destructors were harassing and hampering movement. Seedings in certain Nghe An Province waterways had destroyed or damaged several junks. Fishing nets often entangled the "mines," causing them to explode. These "mined areas" were being avoided by the North Vietnamese. One adopted countermeasure consisted of floating two rafts down

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ROLLING THUNDER TARGET LIST

JAN - FEB - MAR 1968

SYSTEM	APPENDIX					TOTAL TARGETS	STRUCK DURING QUARTER	TOTAL STRUCK
	I	II	III	IV	V			
POWER	6	7	3	7	1	24	7	14
INDUSTRY	2	11	1	3	1	18	2	6
TRANSPORTATION	49	30	15	58	26	178	37	134
MILITARY	8	24	11	20	86	149	7	117
POL	9	3	11	13	18	54	1	36
AIR DEFENSE	9	9	3	4	8	33	14	24
TOTAL	83	84	44	105	140	456	68	331

LEGEND

App I - Authorized Targets
App II - Unauthorized Targets
App III - Targets under Consideration
App IV - Targets Unserviceable
App V - Neutralized or Abandoned Targets

FIGURE 8

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SUMMARY OF RESULTS

1 JAN - 31 MAR 1968

TARGET CATEGORY	DESTROYED	DAMAGED	TOTAL D/D
AAA/AW SITES	20	83	103
SAM SITES	2	41	43
COMMUNICATIONS SITES	12	52	64
MILITARY AREAS	7	69	76
POL AREAS	30	114	144
STAGING/SUPPLY AREAS	2	207	209
BUILDINGS	210	105	315
LOC S	29	580	609
PORTS	0	2	2
POWER PLANTS	1	4	5
RAILROAD YARDS	0	4	4
MOTOR VEHICLES	637	1,009	1,646
RAILROAD VEHICLES	108	155	263
WATER VEHICLES	509	622	1,131
TOTAL	1,567	3,047	4,614

NOTE: Statistical data includes restrikes on many of the fixed targets.

FIGURE 9

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the river with a line strung between them. Rocks were attached to the line as sweeping devices.^{15/}

A summary of strike results for the quarter, by types of targets, is presented in Figure 9. The first three-month period of ROLLING THUNDER 1968, had been frustrating and disappointing. All three months had worse weather than climatology had predicted. However, the second quarter would hopefully bring the transition from the Northeast Monsoon, with its associated poor conditions, to the Southwest Monsoon, historically a period of good weather.

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CHAPTER IV

ROLLING THUNDER TARGET LIST - 2d QUARTER 1968

On 31 March 1968, President Lyndon B. Johnson ordered a cessation of the bombardment of North Vietnam, north of the 20th parallel. This was considered a major step toward de-escalation of the war. In announcing the move, the President said: ^{1/}

"Tonight, I renew the offer I made last August: to stop the bombardment of North Vietnam. We ask that talks begin promptly, that they be serious talks on the substance of peace. We assume that during those talks Hanoi will not take advantage of our restraint.

"We are prepared to move immediately toward peace through negotiations. So tonight in the hope that this action will lead to early talks, I am taking the first step to de-escalate the conflict. We are reducing--substantially--the present level of hostilities, and we are doing so unilaterally and at once. Tonight I have ordered our aircraft and our naval vessels to make no attacks on North Vietnam except in the area north of the demilitarized zone where the continuing enemy buildup directly threatens Allied forward positions and where the movement of their troops and supplies are clearly related to that threat. The area in which we are stopping our attacks includes almost 90 percent of North Vietnam's population, and most of its territory. Thus, there will be no attacks around the principal populated areas, or in the food-producing areas of North Vietnam...."

As ROLLING THUNDER operations began in the second quarter of CY 1968, the entire effort was dominated in many ways by the "partial bombing halt" proclaimed by the President. The proclamation abruptly ended all offensive air efforts north of 20 degrees North latitude as of 0800 hours, Saigon time, on 1 April 1968. On 3 April, the bombing was further restricted to targets below the 19th

NORTH VIETNAM ARMED RECONNAISSANCE ROUTE PACKAGE AREAS

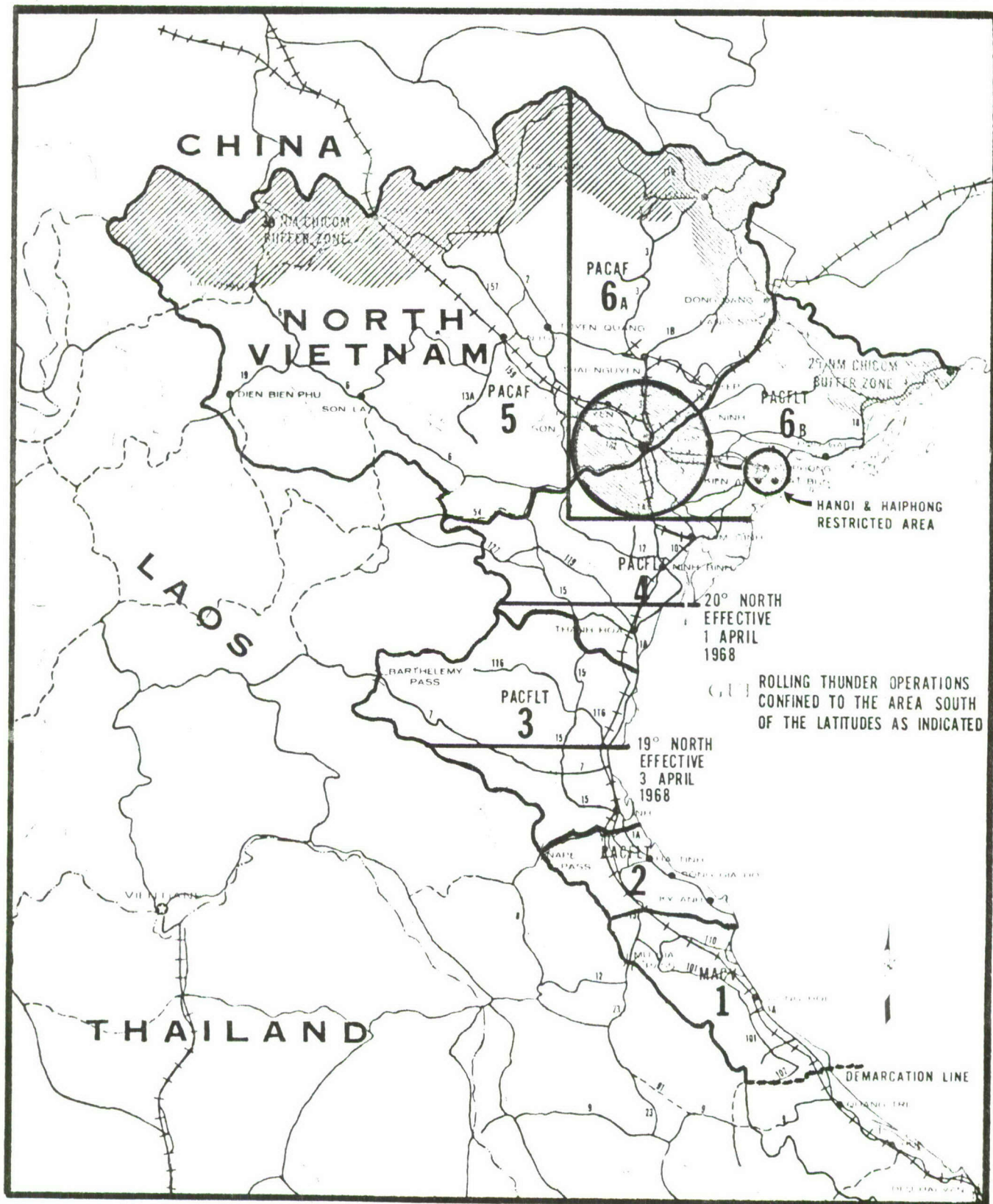


FIGURE 10

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parallel. (Fig. 10.) The restriction was unquestionably a major one, inasmuch as 98 percent of the most lucrative targets were in the area north of the 19th parallel. However, RT operations increased rather than decreased, primarily because of the improving weather over the panhandle, and partly because the Navy now had three large carriers on YANKEE STATION. Route Package I became the primary focal point of USAF operations.^{2/}

The second quarter was characterized by the quantitative increase of combat strikes, mostly against RP I. Although friendly combat losses in April had dropped to eight aircraft, a direct reflection of the shift away from the MIG and SAM "high risk" areas, the losses in May rose again to a total of 16. This higher figure was undoubtedly due to the increased activity in May. The number of sorties further increased in June. The Southwest Monsoon, in full force over Laos, forced the VC/NVA to shift their resupply flow from Laos to the NVN panhandle. The U.S. aircrews were waiting for this shift, of course, and the result, not unnaturally, was an uncommonly heavy attrition of enemy supplies, trucks, and personnel. U.S. forces paid for this performance with the loss of ten aircraft.^{3/}

Even though air operations were confined to the three southern Route Packages, the attack sorties nearly doubled from the previous quarter--27,406 as compared with 14,678. A comparison in percentages of the total sorties flown in the various RPs during the first and second quarters of 1968 follows:^{4/}

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DISTRIBUTION OF ATTACK SORTIES BY ROUTE PACKAGE

ROUTE PACKAGE PERCENTAGES

<u>MONTH</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>VIA</u>	<u>VIB</u>
January	47	8	11	12	6	8	8
February	72	3	8	2	5	8	2
March	68	8	5	6	2	5	6
April	64	28	8	0	0	0	0
May	44	34	22	0	0	0	0
June	50	29	21	0	0	0	0

ROLLING THUNDER Target List - 2d Quarter 1968

The bombing pause permitted the enemy to intensify resupply operations in the South, as well as to conduct extensive reconstruction efforts on key targets in the North. An analysis of the ROLLING THUNDER Target List is presented here for the period of 31 March through 30 June. This treatment examines each of the six target systems in terms of the total installations targeted versus the percentage of those targets evaluated as serviceable or operational.^{5/}

- POWER. The most significant increase in serviceability had been in the electrical power plants which had been struck--86 percent of the estimated NVN electrical power capacity had been rendered unserviceable. Since 31 March 1968, the number of serviceable power plants had increased from 13 (54%) to 20 (83%), and the estimated power available rose from 14 percent to 44 percent of the total prewar capacity. This increase was attributed primarily to the accelerated pace of regeneration since 31 March. ^{6/}
- INDUSTRY. There were 19 industrial installations included in this target system, of which 14 were serviceable. Not included in the 14 serviceable targets was the Thai Nguyen

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Iron and Steel Plant, which showed signs of repair and reconstruction.

- . TRANSPORTATION. Between 31 March and 30 June, the percentage of serviceable transportation targets had risen sharply due to the repair or reconstruction of about 23 targets. The most graphic example was the Doumer Bridge which was not repaired for approximately three months. Less than a month after bombing was restricted beyond 19° North, photography indicated extensive repairs to this vital rail bridge. Work barges had cleared away debris and prefabricated spans were in place by 18 June. The Haiphong RR/Hwy Bridge, destroyed late in 1967, had also been repaired and was serviceable to rail traffic. Considerable expansion of the port facility at Haiphong and a corresponding increase in activity had also been observed since 31 March. Since the bombing pause, the number of RTTL transportation targets evaluated as serviceable to the enemy had risen dramatically from 54 percent to 67 percent.
- . AIR DEFENSE. There were 33 targets in the air defense target system, of which jet-capable fields were the most important. All fields, with the exception of Vinh and Dong Hoi, were located north of 19°. Prior to the cessation of bombing in the northern area, all jet airfields (except Gia Lam), were occasionally unserviceable for short periods of time following air attacks. After 1 April 1968, repair and reconstruction activity had been noted at Bai Thuong, Kep, Yen Bai, and Dien Bien Phu. As of 30 June 1968, jet flight operations had been noted from Phuc Yen, Gia Lan, Kep, Hoa Lac, Bai Thuong, Vinh, Kien An, and probably Yen Bai on a number of occasions.
- . POL. The status of the fixed POL target system had remained relatively unchanged. However, POL imports through the port of Haiphong remained well above the 1967 average of 20,548 MT per month. The 1968 average of POL imports was 38,000 MT/Month with an all-time high of 45,700 MT during April. Photographic evidence conclusively showed that the enemy was rapidly dispersing this vital war-supporting commodity along key LOCs throughout NVN.
- . MILITARY SUPPORT. During the quarter, a total of ten targets had changed to serviceable status. Photography during April and May 1968 revealed extensive activity in handling supplies in the Haiphong area. Also barracks and military areas in and around Hanoi remained usable and active. While the percentage

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change in serviceable targets did not increase sharply, the rise from 30 percent to 37 percent did imply a measure of regeneration.

- . OPERATIONS. An examination of operations for each month of the quarter revealed that the primary strike emphasis in April was against truck parks, storage areas, and military complexes--all in the area below 19° North. Armed reconnaissance strikes were directed against logistic vehicles and interdictions; with variable weather conditions, 7,294 attack sorties were flown during April in Route Packages I, II, and III. 7/

With the appearance of more favorable weather conditions over the lower RPs during May, 9,556 attack sorties were flown, allowing a 24 percent increase over April. The destruction of trucks and watercraft was up appreciably from April. As of 31 May, Annex A to the RTTL contained 465 targets, of which 330 had been attacked one or more times. However, the total damage level to the target systems declined due to the lack of airstrikes in the northern RPs. Two MIG penetrations, one on 23 May and the other on 24 May, resulted in one MIG-21 being destroyed by a Navy TALOS missile. There was every indication that the enemy intended to continue MIG forays to the south whenever the tactical situation permitted. 8/

Continued favorable weather in June permitted increased air activity in NVN. There were 10,436 attack sorties flown against a variety of targets. The monthly loss rate was down in all services with the USAF losing only five aircraft in NVN. SAM firings totaled 16 with one F-4J (NAVY) being shot down. 9/ One MIG-21 was also destroyed.

The following statistics represent each service's attack sorties for

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April, May, and June 1968, along with monthly comparisons: ^{10/}

ATTACK SORTIES AND TRENDS - 2d QUARTER 1968

TREND

	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUN vs MAY (%)</u>		<u>JUN vs PREV 12 MO AVG (%)</u>	
USAF	2,850	3,164	4,151	Up	31	Up	5
USN	3,403	5,839	5,437	Down	7	Up	68
USMC	<u>1,010</u>	<u>637</u>	<u>848</u>	<u>Up</u>	<u>15</u>	<u>Down</u>	<u>3</u>
TOTAL	7,263	9,739	10,436	Up	7%	Up	29%

Although no in-depth analysis had been made, conditions in NVN during the second quarter of CY 1968 appeared to be improved considerably after the bombing limitation. North of the 19th parallel, economic activity revived, and many of the communication and transportation problems eased. There were, still however, labor and manpower shortages, congestion in Haiphong, inflationary pressures, and poor harvests to contend with. ^{11/}

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CHAPTER V

EFFECTS OF BOMBING RESTRICTIONS

As the bombing restrictions continued through the third quarter of ROLLING THUNDER 1968, enemy activity indicated an increased military and industrial buildup in NVN. For example:^{1/}

- . Seaborne deliveries reached a new high.
- . Foodstuffs and POL imports continued at double the 1967 monthly average.
- . General cargo imports reflected an emphasis on reconstruction efforts.

In July, the U.S. forces made enemy infiltration costly by concentrating their strike efforts in the NVN panhandle. As ROLLING THUNDER attack sorties reached 14,382, the highest level since August 1967, the impact produced enemy losses of 1,016 trucks and 673 WBLCs.^{2/} At the same time, the U.S. aircraft combat loss rate continued to decline despite heavily concentrated AAA fire along the major LOCs in the panhandle.^{3/} Considering the upsurge of activity, aircraft losses were relatively light. The Air Force lost eleven aircraft; the Navy lost three, and the Marines lost one--all to ground fire.^{4/}

In August 1968, enemy trucking activity in the panhandle showed a decline of 31 percent from July 1968 and 44 percent from August 1967. The reduced activity could be attributed to a more effective air interdiction program as evidenced by the following:^{5/}

- . Of the trucks sighted, 33 percent were damaged or destroyed vs 25 percent in July.

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- . There was a 35 percent increase in enemy use of waterway LOCs in RP I, possibly to compensate for the loss in trucking capability.
- . The enemy appeared reluctant to use less concealed alternate routes.

The August sortie rate, while lower than the July high by 1,337 sorties, was still the second highest month on record.^{6/} Haiphong imports declined as ship turnaround time equaled an all-time high as a result of port congestion. Rail systems above the 19° parallel were being repaired rapidly, although work was hampered by Red River Delta floods. In RP I, AA weapons appeared to be on the increase, but aircraft loss rates continued to show a downward trend.^{7/}

The Air Force and Navy interdiction campaigns, which had already caused considerable damage to the enemy's logistical network, received additional support from two tropical storms, during September. Strikes against key interdiction points, during breaks in the storm activity, created optimum conditions for blocking roads by causing mud slides and road washouts. Many roads were either closed or washed out completely following the combination of storms and airstrikes.^{8/}

Enemy efforts to protect these key points with heavy AAA and AW fire resulted in a high September loss rate. The Air Force lost seven aircraft, the Navy seven, and the Marines one.^{9/} Total sorties were down to 10,704 for the month. More than 3,500 of the attack sorties, representing 32 percent of the total attack sorties, were flown at night. The extensive night effort provided a round-the-clock pressure on the enemy logistic system.^{10/}

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SAM activity had steadily decreased. In September 1968, Col. G. A. McConnell, Director of Tactical Evaluation DCS/Operations, PACAF stated: ^{11/}

"Efforts to minimize the SAM threat in Route Packages I, II, and III have been largely successful. During the past 6 months reported SAM firings have averaged only 17.3 per month as compared to the 273.3 averaged in North Vietnam during the previous 6 months. Effective reconnaissance, followed by aggressive strikes and IRON HAND SAM suppression, is undoubtedly responsible for the limited SAM activity in the southern portion of North Vietnam. The Air Force's last SAM loss was an F-105F on 29 February 1968."

At the end of September, there were 465 targets on the ROLLING THUNDER Target List, of which only 69 were located below 19° North. Most of these were considered as part of APPENDIX IV or V--unserviceable, abandoned, or neutralized with no evidence of regeneration. However, 23 strikes were conducted against RTTL targets. Figure 11 depicts the RTTL by target system and RTTL appendixes indicating the targets struck during the quarter and providing totals. ^{12/}

A distribution of attack sorties by Route Packages for the period, as compared with the previous quarter follows: ^{13/}

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ROLLING THUNDER TARGET LIST

(JUL - SEP 1968)

SYSTEM	APPENDIX					TOTAL TARGETS	STRUCK DURING QUARTER	TOTAL STRUCK
	I	II	III	IV	V			
POWER	8	8	1	4	4	25	0	14
INDUSTRY	1	13	2	1	2	19	0	6
TRANSPORTATION	47	31	11	22	71	182	15	134
MILITARY	7	24	14	10	97	152	6	116
POL	7	3	10	14	20	54	1	36
AIR DEFENSE	11	9	1	3	9	33	1	24
TOTAL	81	88	39	54	203	465	23	330

LEGEND

App I - Authorized Targets
App II - Unauthorized Targets
App III - Targets under Construction
App IV - Targets Unserviceable
App V - Abandoned or Unserviceable Targets

FIGURE II

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DISTRIBUTION OF ATTACK SORTIES BY ROUTE PACKAGE

<u>MONTH</u>	<u>I (%)</u>	<u>II (%)</u>	<u>III (%)</u>	<u>IV</u>	<u>V</u>	<u>VIA</u>	<u>VIB</u>
April	62	28	10	0	0	0	0
May	44	34	22	0	0	0	0
June	50	29	21	0	0	0	0
July	62	20	18	0	0	0	0
August	60	29	11	0	0	0	0
September	58	31	11	0	0	0	0

A total of 38,135 attack sorties were flown in the third quarter of 1968 in NVN, as compared with 27,406 flown in the second quarter and 14,678 flown in the first quarter.^{14/} The number of attack sorties flown by each service in the individual Route Packages of NVN and the percentage trends are presented here:^{15/}

ATTACK SORTIES AND TRENDS

	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>SEP vs AUG (%)</u>	TREND		
					<u>SEP vs PREV</u>	<u>12 MO AVG (%)</u>	
USAF	6,512	6,366	5,216	DOWN	18	UP	36
USN	5,935	5,260	4,535	DOWN	14	UP	31
USMC	<u>1,935</u>	<u>1,419</u>	<u>948</u>	<u>DOWN</u>	<u>33</u>	<u>DOWN</u>	<u>10</u>
SUB-TOTAL	14,382	13,045	10,699	DOWN	18	UP	28
VNAF	<u>0</u>	<u>0</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
TOTAL	14,382	13,045	10,699	DOWN	18	UP	28

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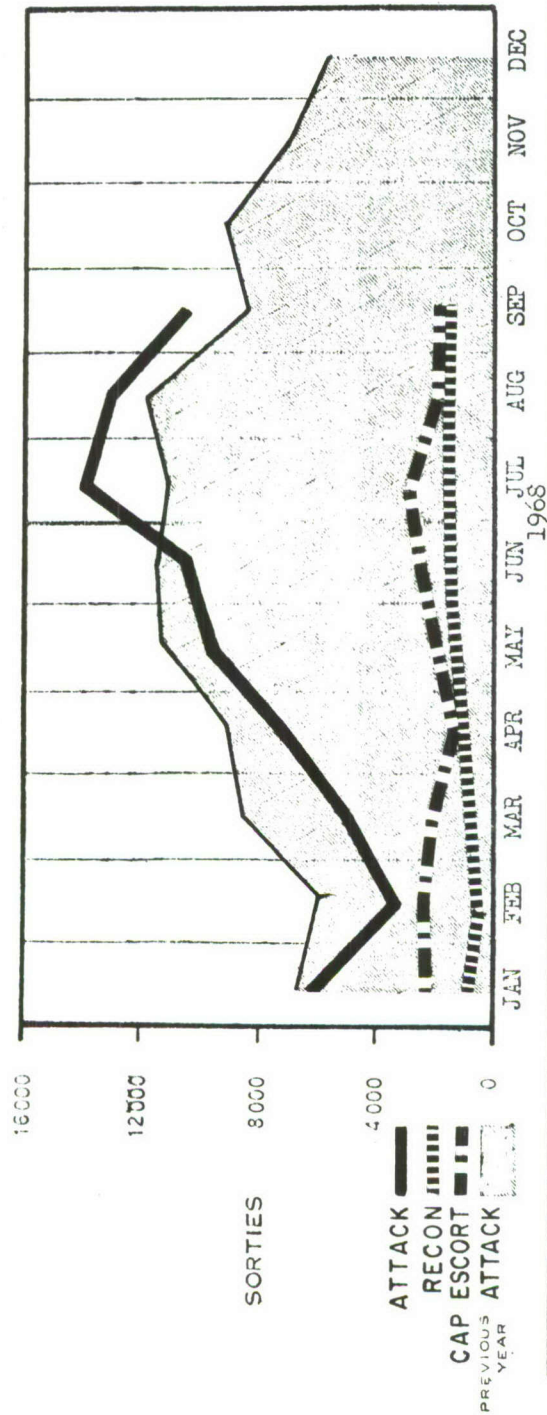
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A breakdown of all ROLLING THUNDER combat sorties, including Attack, Recon, and CAP Escort for all services during the first three quarters of CY 1968 is presented in Figure 12.^{16/}

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ROLLING THUNDER COMBAT SORTIES NORTH VIETNAM



ATTACK	USAF	2930	1840	2835	2850	3164	4090	6512	6366	5216		
	USN	2648	699	1624	3399	5823	5432	5948	5193	4468		
	USMC	779	689	580	1010	752	853	1879	1381	909		
	VNAF	0	0	0	0	0	0	0	0	0		
RECON	USAF	486	324	477	533	805	858	1028	1112	903		
	USN	432	169	379	425	372	410	470	436	381		
	USMC	33	15	0	54	94	27	167	22	12		
	USAF	674	672	563	52	119	157	380	116	122		
CAP ESCORT	USN	1669	1924	1644	1209	2138	2402	2315	1767	1549		
	USMC	28	35	3	3	3	5	13	4	1		
	TOTAL	9679	6367	8105	9535	13270	14234	18692	16397	13561		

SOURCE: Hq USAF, "Trends, Indicators, and Analysis," Oct 68.

FIGURE 12

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CHAPTER VI

ASSESSMENTS AND TRENDS

As the fourth quarter of Calendar Year 1968 began, the 7AF interdiction program reached full fruition. Major roads in NVN remained severely interdicted as attack sorties increased to 11,931, which was approximately 1,232 above the September total. The increase occurred even though weather conditions had grown worse. The primary reason for the increase despite unfavorable weather was the reliance placed upon COMBAT SKYSPOT (MSQ-77) and COMMANDO NAIL (Strike Aircraft Radar) ordnance delivery techniques.^{1/} COMBAT SKYSPOT (CSS) utilized a ground based radar site to direct aircraft to a point in space for ordnance release. COMMANDO NAIL procedures used the internal radar of the strike aircraft for detection of the target, or an offset aiming point; a bombing computer gave the crew steering directions to a point where the ordnance was automatically released. Practically any beacon-equipped aircraft was capable of using the CSS method, whereas only the F-105F, F-4D, A-6, and the F-111 were capable of employing the COMMANDO NAIL method. During the week of 14-22 October 1968, an average of 315 sorties were flown. A PACAF summary reported that each of six primary choke points were struck an average of eight times daily with approximately 10 tons of bombs and CBUs....Much of the effort was radar controlled in weather that would not have permitted visual bombing. Forward Air Controller (FAC) reports and photo intelligence disclosed LOC closure for extensive periods of time."^{2/}

These statistics reflect the level of sorties and associated trends for air attack activities in NVN during October 1968:^{3/}

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ATTACK SORTIES AND TRENDS

	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>OCT vs SEP (%)</u>	<u>OCT vs PREV 12 MO AVG (%)</u>
USAF	6,366	5,216	5,107	DOWN 2	UP 31
USN	5,260	4,535	5,458	UP 20	UP 44
USMC	<u>1,419</u>	<u>948</u>	<u>1,366</u>	<u>UP 44</u>	<u>UP 27</u>
SUB-TOTAL	13,045	19,699	11,931	UP 12	UP 36
VNAF	<u>0</u>	<u>0</u>	<u>0</u>		
TOTAL	13,045	10,699	11,931	UP 12	UP 36

The 7AF Summer Air Interdiction Campaign, continued until 31 October 1968. Initially begun as a 30-day effort on 14 July, the operation had been extended because of its great success. Selected interdiction points on Routes 15 and 137 leading into Mu Gia and Ban Karai Passes were struck on a daily basis. The enemy's truck fleet was gradually decimated as he was forced to deplete his stockpiles in Route Package I. Finally, in October, as a result of the Ban Laboy Ford being closed for more than 30 days, all truck traffic from NVN into Laos ceased. It was readily apparent, from the reduction in logistics flow to the battlefields, and from the subsequent enormous attrition inflicted within the battle areas of SVN, that the enemy had suffered a genuine setback. The observed exodus of between 16 and 18 regiments out of SVN to rear base areas was clearly an indication that these units were suffering from shortages of food, ammunition, and medical supplies.^{4/}

The truck stoppage quite naturally created a distinct increase in supplies moved by waterborne logistic craft in the RP I area. Extensive seeding of

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MK-36 destructors and expanded strikes against transshipment points, water crossings, and waterways effectively counteracted this flow. The movement of supplies by any means eventually fell to an unprecedented low in October.^{5/}

During the period from 1 January through 31 October 1968, in RP I alone, 15,217 trucks had been observed. Airstrikes had destroyed 1,318 trucks and damaged 1,346. Bomb damage assessment included 6,446 secondary explosions, 11,719 secondary fires, and 5,863 highway interdictions. It was noted by 7AF that the Summer Air Interdiction Campaign (a part of ROLLING THUNDER) could probably not have succeeded nearly so well without the effective U.S. Naval air interdiction of massive amounts of enemy supplies being moved southward from the 19th parallel.^{6/}

Suddenly and dramatically, ROLLING THUNDER operations came to an end on 1 November 1968 by Presidential proclamation. Before the standdown became effective at 2100H, 346 attack sorties were flown on the final day by Air Force, Navy, and Marine pilots.^{7/}

The bombing halt required very few changes in procedures as to realignment of the areas of responsibility. Seventh Air Force established a ten-mile-wide Positive Control Area (PCA) along the NVN Border, and any aircraft fraggged into this area were required to be under positive control. Positive control was exercised by COLLEGE EYE (EC-121 Airborne Early Warning and Control aircraft) north of 18°, or by COMBAT SKYSPOT, or a FAC south of 18°. All forces remained in an operational ready status in the event hostilities should be resumed.^{8/}

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CHAPTER VII

SUMMARY

Within the confines of restrictions placed on it by higher authority, ROLLING THUNDER accomplished its military objectives as long as it was permitted to continue. Prior to the bombing halt on 1 November 1968, the USAF had flown 43,976 combat sorties in NVN during CY 1968. Some interesting results included 1,374 trucks destroyed; 6,452 road cuts and landslides, 955 structures destroyed, 136 bridges destroyed, and 1,033 watercraft destroyed. These were just the known effects, many other items of equipment were undoubtedly heavily damaged. Figure 13 depicts the ROLLING THUNDER Sorties by service, month, and type for 1968.^{1/}

Operation THOR

Operation THOR began on 1 July 1968, and ended on 7 July. As a relatively small operation, but still a part of ROLLING THUNDER, it was designed to place massive air, naval, and artillery fire on NVA field artillery positions in the Cap Mui Lay sector of the TALLY HO operating area. The objectives of the operation were to neutralize the AAA threat against USMC airborne FACs operating above the DMZ and to eliminate the enemy artillery fire against the USMC supply line which resupplied Dong Ha.^{2/} During this short period, the USAF flew 861 strike sorties; the USMC flew 630; and the USN flew 500, making a total of 1,991 strike sorties. Additionally, the USAF flew 169 reconnaissance sorties (EB-66 and RF-101), and the USMC flew 82 (EA-6 and RF-4). USAF FACs also contributed 70 missions to the effort (F-100 and O-2). A total of 2,318 sorties of all types were flown in support of Operation THOR. The total amount

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ROLLING THUNDER SORTIES

1968	USAF Attack CAP/RESCAP	U.S. NAVY Attack CAP/RESCAP	U.S. MARINES Attack CAP/RESCAP	TOTAL Attack CAP/RESCAP
Jan	2,930	2,638	181	5,749
Feb	1,840	778	694	3,312
Mar	2,835	1,628	580	5,043
Apr	2,850	3,403	1,010	7,263
May	3,164	5,839	736	9,739
Jun	4,151	5,437	848	10,436
Jul	6,512	5,935	1,935	14,382
Aug	6,366	5,260	1,419	13,045
Sep	5,216	4,535	948	10,699
Oct	5,107	5,458	1,366	11,931
Nov	144	139	63	346
Dec				

(ROLLING THUNDER discontinued, effective 1 Nov 68)

* November strike missions were flown in hours before bombing halt was effected.

SOURCE: (TS) Rprts, Hq PACAF, subj: Summary of Air Ops SEA (U), Gp-1.
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of ordnance dropped was 8,363 tons. The total reported BDA was: 177 secondary explosions; 152 secondary fires; 28 killed by air (KBA); 126 artillery positions destroyed, and 18 damaged; 399 AAA positions destroyed, and 38 damaged; 2 SAM sites destroyed; 2 confirmed field artillery pieces destroyed; 11 AAA-occupied sites confirmed destroyed. Operation THOR was considered successful in that it did create a permissive environment for USMC airborne FACs and eliminated the artillery fires on the USMC supply lines.^{3/}

AF Attack Sorties/Losses/Rate

The Air Force attack sorties/loss rate for the year were extremely low. Of the total 41,051 attack sorties flown, only 54 aircraft were lost: a loss rate of 1.32 aircraft per thousand sorties flown. This compared favorably with losses during the years 1967 and 1966. Route Package I received nearly all of the sorties--about 38,957--its loss rate was only 1.10 with 43 aircraft losses. Route Package II had the second largest loss rate of 8.62, but this high rate was misleading since only one aircraft was lost out of only 142 sorties. With 178 sorties generated, RP III had a zero loss rate. There were 97 sorties flown in RP IV with no losses. RP V received 601 attack sorties, with two aircraft lost for a rate of 3.33. RP VIA had a fairly high loss rate of 5.20 out of 962 sorties, with five aircraft being shot down in the first three months of 1968. The largest loss rate for the year was in RP VIB with a rate of 26.32; 3 aircraft were lost from only 164 sorties flown. The loss rates per 1,000 attack sorties for 1967 and through December 1968, respectively, were:

	<u>1967</u>	<u>1968</u>
NVN	2.4	1.10

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The significant decrease in the loss rate for attack sorties in 1968 in NVN obviously occurred, because ROLLING THUNDER was confined to the less heavily defended areas (the lower RPs) during most of the year.^{4/}

Targets Damaged/Destroyed 1968

A breakdown of target results by type and month is presented in Figure 14 from January to 1 October 1968. Figure 15 depicts the percentages of the total effort, flown in each Route Package by month. RP I received the greatest effort in each month with RPs II and III just behind.^{5/}

Air Defense Activity - NVN 1968

SAM activity was not as effective in 1968 as it had been in 1967. U.S. losses totaled 61 in 1967 but only 11 in 1968. In 70 MIG engagements in 1968, the U.S. shot down 16, while losing 12. U.S. losses to AAA/AW causes came to 86. Thirty-three aircraft were lost to undertermined causes. Total aircraft losses to air defense amounted to 109 for the year as compared with 328 in 1967, a notable reduction.^{6/}

A review of all ROLLING THUNDER sorties for 1966, 1967, and 1968 indicated the least productive periods were the first three months of each year, and the most productive periods occurred during the summer months. It is significant that the trends for each year were markedly similar, clearly indicating that the fluctuations were due to circumstances caused by weather. Prior to the cessation of bombing operations in 1968, U.S. aircraft flew an average of 11,400 combat sorties a month in NVN, comparing favorably with the 1967 rate. The largest number of combat sorties for any month of the war was flown in

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1968 - RT TARGETS DAMAGED OR DESTROYED

TARGET CATEGORY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL D/D
AA/AAA Sites	17	5	21	62	118	193	231	152	73	930
SAM Sites	11	4	28	3	20	24	4	14	1	109
Communication Sites	20	12	32	15	4	5	8	4	3	103
Military Areas	22	20	34	15	19	57	54	67	16	307
POL Areas	0	1	143	26	10	34	8	238	455	915
Staging/Supply Areas	89	16	104	68	47	209	91	40	16	700
Buildings	155	35	125	199	149	101	314	309	205	1592
LOCs	327	41	241	502	675	947	1282	1222	576	5813
Ports	2	0	0	3	2	6	5	6	4	28
Power Plants	0	1	4	1	0	0	0	0	0	6
Railroad Yards	2	0	2	1	0	1	0	0	0	6
Motor Vehicles	654	322	670	758	1099	1202	1286	1042	546	7579
Railroad Vehicles	230	10	23	10	32	43	6	30	9	383
Water Vehicles	739	117	275	502	416	666	952	1141	1105	5913
TOTAL	2258	584	1702	2165	2591	3488	4241	4265	3009	24,384

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PERCENTAGES OF
ROLLING THUNDER SORTIES BY ROUTE PACKAGE

	<u>RP I</u>	<u>RP II</u>	<u>RP III</u>	<u>RP IV</u>	<u>RP V</u>	<u>RP VIA</u>	<u>RP VIB</u>
Jan 68	47	8	11	12	6	8	8
Feb	72	3	8	2	5	8	2
Mar	68	8	5	6	2	5	6
Apr	62	28	10	0	0	0	0
May	44	34	22	0	0	0	0
Jun	50	29	21	0	0	0	0
Jul	62	20	18	0	0	0	0
Aug	60	29	11	0	0	0	0
Sep	58	31	11	0	0	0	0
Oct	57	33	10	0	0	0	0

FIGURE 15

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SUMMARY OF AIR DEFENSE ACTIVITY - NVN 1968

Mo, 1968	Nr of Firings	SAM US Losses	Engage- ments	MIG		Total Posns	AAA/AW Total Occupied Posns	US Loss	US Loss to Unk
				Losses NVN	US				
Jan	140	4	29	4	6	36,303	7,830	8	6
Feb	170	4	18	5	4	37,242	7,641	2	3
Mar	216	0	5	0	0	37,630	7,443	6	3
Apr	8	0	0	0	0	38,163	7,278	8	2
May	33	0	2	0	1	38,985	8,000	13	4
Jun	16	1	7	1	1	41,492	7,686	6	3
Jul	11	0	3	3	0	43,275	8,188	13	3
Aug	19	1	3	1	0	43,635	8,018	8	6
Sep	16	1	3	2	0	44,397	7,891	12	1
Oct	17	1	0	0	0	37,647	5,232	12	2
Totals	646	11	70	16	12	N/A	N/A	88	33

* 15 MIGs were destroyed on the ground.

FIGURE 16

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July 1968.^{7/}

Hanoi and Haiphong were recognized as the major logistic centers through which the majority of imports of war materials had to pass. The highest value targets were also located in the immediate environs of these logistics centers. It was clearly evident that the destruction or damage of targets in one category, railroads for example, would have an impact on the effectiveness of other target categories. A cumulative effect could be expected from successful attacks against higher priority targets. Much of the early 1968 ROLLING THUNDER campaign was directed toward the destruction of railroad, air, and waterway lines of communications and associated targets. This concept was followed to isolate Hanoi and Haiphong from the rest of NVN, as well as from each other.^{8/}

Although these urban areas provided the more lucrative targets, the restrictions noted earlier precluded an all-out campaign, and only a portion of the most profitable targets were attacked.^{9/}

In retrospect, ROLLING THUNDER had denied North Vietnam a complete sanctuary from which to export war making supplies. Until March 1968, attacks against military-associated targets had reduced a marked portion of the industrial output. Major LOCs were repeatedly cut or disrupted. Thousands of units of war-supporting materials, trucks, and WBLCs were damaged or destroyed in spite of targeting, political, and geographical constraints. In other words, ROLLING THUNDER accomplished its military goal of making it difficult and costly for NVN to continue its aggression in South Vietnam.^{10/}

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EPILOGUE

In January 1969, reconnaissance sorties indicated that NVN was continuing a massive supply buildup. Transshipment points were enlarged, improved, and handled large quantities of supplies. Oceangoing vessels, including Free World ships, were now calling on the Port of Vinh to offload supplies. New POL storage areas with a capacity of 2,500,000 gallons were reported. Truck sightings, although down from December 1968, still numbered 5,960. Waterborne Logistic Craft sightings increased from 2,191 in December to 2,844. Rail-^{1/}road 7, the only railroad in the panhandle, was almost completely operable.

NVN had taken advantage of the bombing halt by moving additional fighter aircraft back from China and increasing training activities. Repairs had been completed at Vinh Airfield, south of the 20th parallel, and activity was noted that would enable the forward staging of jet aircraft there. SAM battalions increased from three to an estimated nine units; air defenses increased by more than 500 AAA guns; and an estimated 50 sets of radar equipment were added, including at least two new GCI sites, for a more effective early warning and air defense control system.^{2/}

NVN had returned to almost normal economic activity. The volume of supplies moving south had almost doubled. New major logistic centers had been established southward, and most importantly, increased use of shipping southward had freed land transportation assets for movement of supplies into Laos. As a final comment, an excerpt from the PACOM Intelligence Digest of 14 March 1969, is presented as a comprehensive treatment of the situation at the time.^{3/}

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"The North Vietnamese presently have complete freedom of movement south to the DMZ and west to the Laos Border. Oceangoing vessels up to 2,600-ton capacity have been photographed at anchor off Vinh and Quang Khe. An estimated 2,500 tons of supplies per day come over the docks at Quang Khe in December. Bulk POL is being stockpiled in the Vinh area. Vinh Petroleum Product Storage Facilities (PPS) unserviceable and unused prior to 1 November, has an estimated current capacity of 2,500 or more metric tons. POL is being stored in large, partially underground, tank sites all the way down to the DMZ. The enemy has constructed a pipeline that is now over 45 miles long and stretches from north of Vinh along Route 15 almost to the Laos border. Indications are the line is to be extended into Laos, and may be connected to the Vinh PPS at this time. Rail service is continuous to Vinh and shuttles all the way to the Route Package I border. Large storage areas and transshipment points have sprung up on Route 15 within 15 miles of the Laos Border. Bridges that have not been used regularly since the bombing started are up and in use on LOCs leading to the DMZ. In short, the logistic machinery is now functioning without restraint at levels never reached at any time, even before the war."

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* Extracts from TOP SECRET documents are classified no higher than SECRET.

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GLOSSARY

AA	Antiaircraft
AAA	Antiaircraft Artillery
AAA/AW	Antiaircraft Artillery/Automatic Weapons
Avg	Average
BDA	Bomb Damage Assessment
CBU	Cluster Bomb Unit
ChiCom	Chinese Communist
CINCPAC	Commander-in-Chief, Pacific Command
CINCPACAF	Commander-in-Chief, Pacific Air Forces
CINCPACFLT	Commander-in-Chief, Pacific Fleet
COMUSMACV	Commander, United States Military Assistance Command, Vietnam
CSS	COMBAT SKYSPOT
CTF	Commander, Task Force (USN)
CY	Calendar Year
DMZ	Demilitarized Zone
FAC	Forward Air Controller
JCS	Joint Chiefs of Staff
KBA	Killed by Air
LOC	Line of Communications
MACV	Military Assistance Command, Vietnam
MT	Metric Ton
NVA	North Vietnamese Army
NVN	North Vietnam
NW	Northwest
PACAF	Pacific Air Forces
PACFLT	Pacific Fleet
PCA	Positive Control Area
POL	Petroleum, Oil, and Lubricants
Posn	Position
PPS	Petroleum Product Storage
Prev	Previous

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RP	Route Package
RT	ROLLING THUNDER
RTTL	ROLLING THUNDER Target List
RVN	Republic of Vietnam
SAM	Surface-to-Air Missile
SSE	South-Southeast
STPD	Short Tons Per Day
Unk	Unknown
USMC	United States Marine Corps
USN	United States Navy
USSR	Union of Soviet Socialist Republics
VC	Viet Cong
WBLC	Waterborne Logistics Craft